Background Pressure derived indices of coronary stenosis severity improve outcomes when used to guide revascularisation. But adoption is limited due to the need for vasodilator administration. These are required to induce stable microvascular resistance, when the trans-stenotic pressure gradient is proportional to flow; under such conditions pressure can be used as a surrogate for flow. The instant wave-free ratio (iFR) is a vasodilator-free pressure-only index of coronary stenosis severity calculated during the diastolic wave-free period. We aim to characterise the haemodynamics of the wave-free period and determine if the trans-stenotic pressure gradient is proportional to flow during this period at rest.

Methods Pressure and flow velocity was measured in 56 vessels distal to a coronary stenosis at rest. Mean flow velocity, resistance, trans-stenotic pressure gradient and distal to proximal pressure ratio was calculated over the complete cardiac cycle, and 50 intervals within diastole. Instantaneous diastolic pressure gradient-flow velocity curves were constructed.

Results The diastolic wave-free period was the only period in the cardiac cycle where the pressure loss due to the stenosis had a proportional relationship with underlying flow velocity. This varied according to stenosis severity (mean pressure gradient: 4.4 ±4.2 mm Hg mild (FFR0.81–1.0) vs 13.3±12.2 mm Hg moderate (FFR 0.6–0.8) and 55.7±11.1 severe (FFR <0.60) stenoses, p<0.001).

Conclusion The diastolic wave-free period is the only period within the cardiac cycle when the trans-stenotic pressure gradient is proportional to flow. The instant wave-free ratio, calculated during the diastolic wave-free period, can therefore be used to make assumptions about underlying intra-coronary flow conditions without the need for vasodilators; potentially improving the adoption of physiologic guided revascularisation.

052 **THE TRANS-STENOTIC PRESSURE GRADIENT DURING THE DIASTOLIC WAVE-FREE PERIOD IS PROPORTIONAL TO FLOW: THE PHYSIOLOGICAL BASIS OF THE INSTANT-WAVE-FREE RATIO**

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